

## Another Look at the Muricine Genus *Attiliosa*

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This paper is fondly dedicated to the memory of the late Anthony D'Attilio.

**Abstract.** Prior to this study, the muricine genus *Attiliosa* comprised 13 (or possibly 14) species, known from tropical waters around the world, and ranging in age from Oligocene to Recent. Of this number, four were known from the fossil record: two (or three) from Europe, and two from the New World. The present study adds seven new species. Of these, three are fossil forms: *A. gretae*, from the Early Miocene Chipola Formation, northwestern Florida; *A. macgintyi*, from the Pliocene Tamiami Formation, southern Florida; and *A. gibsonsmithi*, from the Late Miocene Mataruca Member, Cujaro Formation, Venezuela. The four Recent species are: *A. bessei* and *A. kevani*, from the Caribbean; *A. perplexa*, from Brazil; and *A. houarti*, from the eastern Indian Ocean (Thailand).

### INTRODUCTION

Seventeen years ago a review of the genus *Attiliosa* Emerson, 1968, noted that it "is a small muricine group with but a few species" (Vokes & D'Attilio, 1982:67). In that review, we recognized a total of five or six living species. There was a single eastern Pacific species [*A. nodulosa* (Adams, 1855)], and two western Atlantic ones [*A. aldridgei* (Nowell-Usticke, 1969) and *A. philippiana* (Dall, 1889)]. In the Indo-Pacific area there were two [*A. nodulifera* (Sowerby, 1841) and *A. orri* (Cernohorsky, 1976)], and possibly a third [*A. caledonica* (Jousseume, 1881)], which might or might not be a synonym of *A. nodulifera*. However, additional material has shown *A. caledonica* to be a valid species.

At that time, the fossil record in the New World consisted of a few specimens of *A. aldridgei* from the Mio-Pliocene Gurabo Formation, Dominican Republic, and a single example of *A. nodulosa* from the Early Pliocene Esmeraldas beds, Onzole Formation, of northwestern Ecuador.

However, the group also has a long history in the Old World where there is an apparently unnamed species in the Oligocene Stampian of France that is markedly similar to *A. attiliosa* (compare Figure 1 and Figure 17, for example). There is a second French species of Middle Miocene Burdigalian age, originally named *Taurasia sacyi* by Cossmann & Peyrot (1923:257, pl. 13, figs. 31, 32) that may or may not be a synonym of the contemporaneous Italian *Fusus villae* Michelotti, 1847. The original illustration of the latter (Michelotti, 1847:pl. 10, fig. 11) is poor, but it was somewhat better illustrated by Bellardi (1872:pl. 9, fig. 20). On the basis of these illustrations, it is probable that *A. villae* and *A. sacyi* are the same species, but with no Italian material available for study, this is not certain.

Thus, in 1982, there was a total of seven (or nine) known species of *Attiliosa*: two (or maybe three) occurring in the fossil record of Europe: three in the Recent fauna of the New World (two of these also occurring in the fossil record) and possibly three Recent Indo-Pacific forms. Since that time, there have been five additional living species described: *A. goreensis* Houart, 1993, from the eastern Atlantic (Senegal); *A. glenduffyi* Petuch, 1993, from the western Atlantic; *A. bozzettii* Houart, 1993, from the western Indian Ocean (Somalia); *A. ruthae* Houart, 1996, from the Philippine Islands; and *A. edingeri* Houart, 1998, from Western Australia.

In the last 17 years much new material has been made available, both fossil and Recent. This paper adds three new fossil species from the western Atlantic, and four new Recent species, three from the western Atlantic and one from the Indian Ocean. Synonymies for those Recent species covered previously (Vokes & D'Attilio, 1982) are not complete but include only the original references and those citations subsequent to 1982; the reader is referred to that paper for more complete information. Likewise, the European fossil species are not treated systematically due to lack of information.

On the basis of morphological similarities, there is one group of species beginning with the French Oligocene *Attiliosa* sp. (Figure 1) and including the modern *A. aldridgei*, *A. bessei*, and *A. kevani*, in the western Atlantic. The eastern Atlantic *A. goreensis* is extremely similar to the Oligocene *Attiliosa* sp. and also may be included as a member of the "*aldridgei* complex." The more squamose Indo-Pacific *A. bozzettii* and *A. houarti* and the spinose *A. orri*, although less similar in morphology are, nevertheless, close enough to indicate that they too should be placed in this group, as are *A. nodulifera*, *A. caledonica*, and *A. ruthae*. All of these species share a rounded aperture, with an expanded columellar lip and a surface

ornamentation that is more or less scabrous, sometimes with small spines developed at the intersection of the spiral and axial ornamentation.

A second morphological grouping would include: the French Miocene *A. sacyi* (Figure 2); the two new western Atlantic fossil species *A. macgintyi* and *A. gibsonsmithi*; *A. nodulosa* in the eastern Pacific; *A. philippiana* in the Caribbean; and perhaps *A. perplexa* on the coast of Brazil. These species share an elongated aperture with a narrow columellar lip and, with the exception of *A. perplexa*, no varical spines. The recently described Australian species *A. edingeri* bears a sufficient resemblance to the eastern Pacific *A. nodulosa* to be included also in this group. A third more distantly related set begins with the Early Miocene *A. gretae* in northwestern Florida, and includes only the living Caribbean *A. glenduffyi*.

#### ABBREVIATIONS FOR REPOSITORIES OF FIGURED SPECIMENS

AMNH, American Museum of Natural History, New York, New York, USA; IRSNB, Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; MNHN, Muséum National d'Histoire Naturelle, Paris, France; NMB, Naturhistorisches Museum, Basel, Switzerland; SDSNH, San Diego Natural History Museum, San Diego, California, USA; UF, Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA; USNM, National Museum of Natural History, Washington, DC, USA.

#### SYSTEMATICS

Family MURICIDAE Rafinesque, 1815

Subfamily MURICINAE Rafinesque, 1815

Genus *Attiliosa* Emerson, 1968

*Attiliosa* Emerson, 1968:380.

**Type species:** *Coralliophila incompta* Berry, 1960 (= *Peristernia nodulosa* A. Adams, 1855), by original designation.

**Diagnosis:** Shell stoutly biconic; axial ornamentation of six to 12 rounded ridges, rarely with short spinose processes developed at intersection of axial and spiral ornamentation; aperture large, with nodules or lirations on inner side of outer lip and two or three nodules at anterior end of columellar lip; siphonal canal short, recurved, forming siphonal fasciole.

**Discussion:** The relatively small (both in number of species and size of shell) genus *Attiliosa* is what one might consider the "tag-end" of the subfamily Muricinae. These plain shells bear little familial resemblance to the more elaborately varicose groups in the subfamily, such as *Murex* or *Chicoreus*. In most cases, the shells are almost non-varicate, with little more than axial ridges to mark previous positions of the aperture. On some species there are short spinose processes on the varices, e.g., *A. nodulifera* (Figure 43), which led to its original definition in the genus *Murex*, but the majority bear no more than a few spinelets, if any.

This non-varicate morphology has led to a great deal of confusion among workers as to the systematic position of the few species named prior to Emerson's recognition (1968:370) of the true nature of the genus, with its muricine radula. As a measure of the dubious appearance of the members of this genus, they have been placed at various times in the following genera: *Coralliophila*, *Calotrophon*, *Drupa*, *Fusus*, *Latiaxis*, *Murex*, *Muricopsis*, *Muricidea*, *Ocenebra*, *Peristernia*, *Phyllonotus*, *Poirieria*, *Ocenebra*, *Taurasia*, *Trophon*, *Typhis*, *Vasum*, and probably others!

The shells that have engendered this confusion may be characterized as stoutly biconic and generally small for the subfamily (most specimens are under 30 mm in length). There are from six to 12 axial ridges, which may or may not have small spinose processes, and the shell surface varies from scabrose to smooth. The aperture is relatively large, varying from round to elongate, and an anal channel may be present. The most distinctive generic characters are the strong elongate nodules or lirations on the inner side of the outer lip that may extend well back

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#### Explanation of Figures 1 to 9

Figure 1a, b. *Attiliosa* sp. USNM 377398; height 17.7 mm, diameter 10.4 mm; locality: Gaas, France, Stampian. ×3.

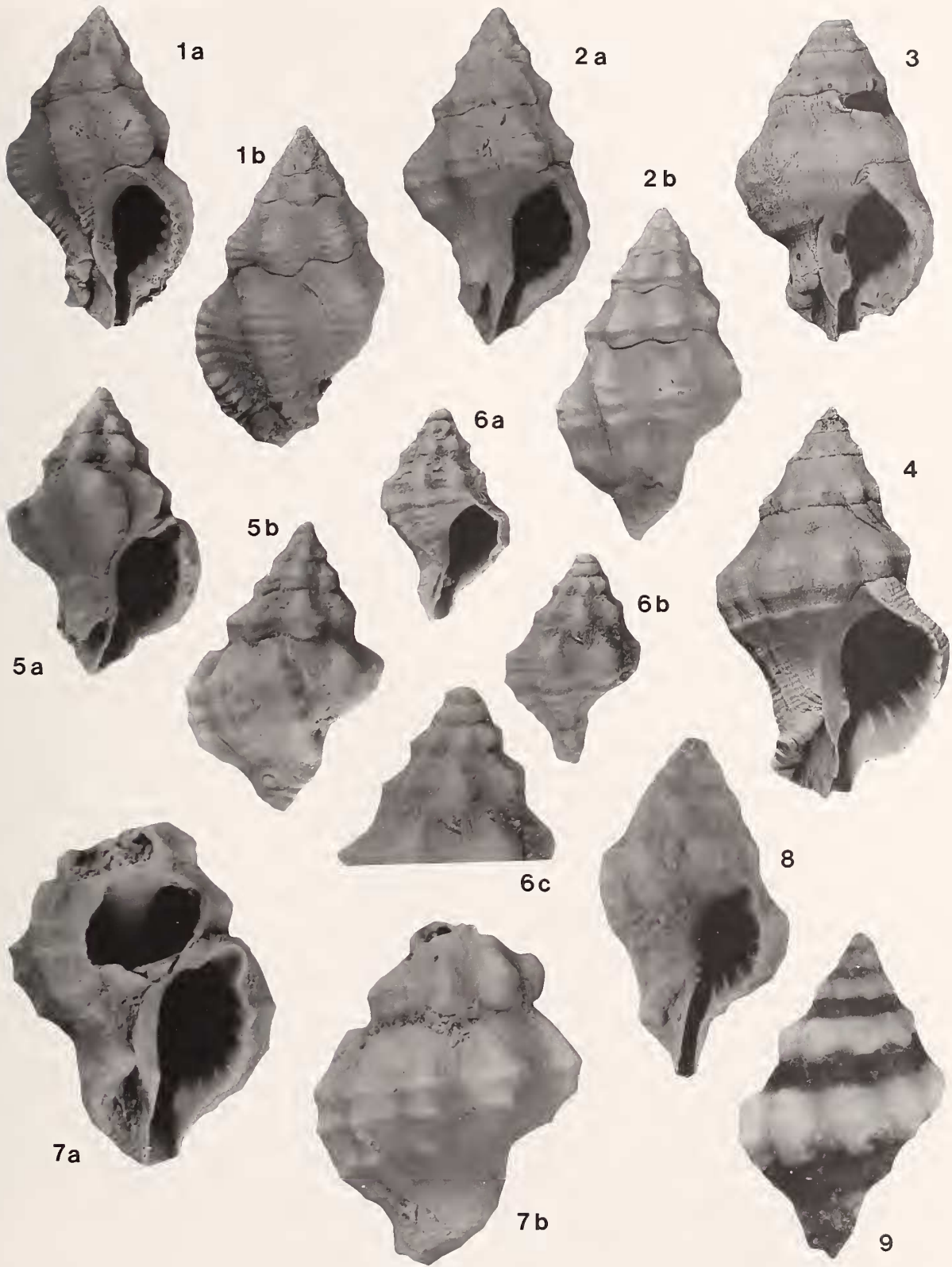
Figure 2a, b. *Attiliosa sacyi* (Cossmann & Peyrot, 1923). NMB H-18088; height 13.2 mm, diameter 7.4 mm; locality: St. Paul, Dax, France, Burdigalian. ×4.

Figures 3 and 4. *Attiliosa nodulosa* (A. Adams, 1855). Figure 3. USNM 418059; height 25.7 mm, diameter 16.6 mm; locality: TU 1399, Esmeraldas beds, Onzole Formation. ×2. Figure 4. USNM 859927; height 31.5 mm, diameter 19.0 mm; locality: TU R-487, Guaymas, Sonora, Mexico. ×2.

Figures 5–7. *Attiliosa gretae* E. H. Vokes, sp. nov. Figure 5a, b.

USNM 498197 (Holotype); height 7.7 mm, diameter 4.9 mm; locality: TU 458, Chipola Formation ×6. Figure 6a, b. USNM 498198 (Paratype A); height 5.7 mm, diameter 3.7 mm; locality: TU 819, Chipola Formation. Figure 6a, b ×6; 6c ×10. Figure 7a, b. USNM 498199 (Paratype B); height 9.3 mm, diameter 7.2 mm; locality: TU 819, Chipola Formation. ×6.

Figures 8 and 9. *Attiliosa glenduffyi* Petuch, 1993. Figure 8. USNM 860299; height 13.9 mm, diameter 8.0 mm; locality: Dominican Republic. ×4. Figure 9. USNM 860298; height 14.3 mm, diameter 9.2 mm; locality: Dominican Republic (shell not whitened, to show color pattern). ×4.



into the aperture, and the two or three elongate nodules (reduced to only one in *A. perplexa*) on the anterior portion of the columellar lip, which may or may not be expanded at the anterior end. The siphonal canal is short and recurved distally, which gives rise to a siphonal fasciole.

From the list of "possible" genera cited above, the members of the genus *Attiliosa* may be separated from most by the presence of a muricine radula and operculum. *Murex* and *Phyllonotus* were used only in the broadest sense and, as defined today, have little resemblance. *Calotrophon* and *Poirieria* (*Panamurex*) are the two most similar appearing taxa; the morphological similarity is close to some species, especially the Miocene *Calotrophon phagon* (Gardner, 1947) and *Poirieria* (*Panamurex*) *mauryae* Vokes, 1970. Both of these species share with *Attiliosa* the columellar nodules and labral lirations, causing us previously (Vokes & D'Attilio, 1982:68) to suggest that *Attiliosa* originated as a branch of the *Poirieria* clan. Discovery of the Oligocene species assigned to *Attiliosa* pushes the separation further back in time; nevertheless it is to the *Poirieria* clan that *Attiliosa* bears the strongest morphological similarity.

In the Muricidae, convergence of shell form is a common problem. Thus, one branch of *Panamurex*, beginning with *P. mauryae*, in time has moved in the direction of shell simplification, resulting in the Recent *P. (P.) velero* Vokes, 1970, which becomes morphologically much like *Attiliosa*, differing primarily in the strong spiral ornamentation, more inflated whorls, and more elongate overall outline. However, *Calotrophon*, in time, has gone in the direction of greater shell ornamentation, as well as losing the columellar nodules, so that the living members of *Calotrophon* are less easily confused with *Attiliosa*.

In the final analysis, one must be reminded once again that the concept of generic separation is completely artificial and is "in the eye of the beholder." We are attempting to separate the colors of the spectrum into discrete boxes. Which box one places which species in is largely subjective. There are certain forms that are unequivocal (like red, yellow, or blue) but others are less certain (does turquoise belong with blue or green?).

Those species that are here grouped in the concept called *Attiliosa* share a short "squatty" shell outline, with usually a rounded shoulder. Most are non-varicate. But none of these attributes is absolute: *A. maccintyi* has a distinctly diamond-shaped outline, and both *A. nodulifera* and *A. orri* have spinose varices. The alternative to accepting these exceptions is to create yet more smaller boxes to contain them, and in time this may well happen, if enough additional similar appearing forms are discovered. After all, we started with one genus *Murex*, which has been repeatedly subdivided into first more genera, then into families and subfamilies.

The solution, at this time, is to divide the genus into "species-complexes," which at some future date might

well become recognized genus-group taxa. On the basis of shell morphology, the genus *Attiliosa* may be separated into three distinct species-complexes, as follows:

- (1) The *aldridgei*-complex, characterized by a rounded aperture, expanded columellar lip, more or less scabrous surface ornamentation, sometimes with small spines developed at the intersection of the spiral and axial ornamentation. This complex includes: the unnamed French Oligocene species; *A. aldridgei*, *A. bessei*, *A. kevani*, in the western Atlantic, and *A. goreensis*, in the eastern Atlantic; *A. bozzettii*, *A. orri*, *A. houarti*, in the Indian Ocean; and *A. nodulifera*, *A. caledonica*, and *A. ruthae* in the Pacific.
- (2) The *nodulosa*-complex, characterized by an elongated aperture, narrow columellar lip, more or less smooth surface ornamentation, and no varical spines (with the exception of *A. perplexa*). This complex includes: *A. sacyi* (?+*A. villae*), from the Miocene of Europe; *A. gibsonsmithi*, *A. maccintyi*, *A. philippiana*, and *A. perplexa*, in the western Atlantic; *A. nodulosa* in the eastern Pacific; and *A. edingeri* in the Indian Ocean.
- (3) The *glenduffyi*-complex, distinguished from the others by a marked anal channel and including only the Miocene *A. gretae* and the Recent western Atlantic *A. glenduffyi*.

#### FOSSIL SPECIES

*Attiliosa gretae* E. H. Vokes, sp. nov.

(Figures 5–7)

**Description:** Shell small for the genus (maximum height approximately 12 mm); protoconch of two large, smooth bulbous whorls, ending at small varix. Axial ornamentation on all teleoconch whorls of eight rounded ridges; on earliest teleoconch whorls small open flanges on abapertural side of ridges but these disappearing by about fourth teleoconch whorl. Spiral ornamentation of one strong cord at shoulder, on early whorls several smaller cords anterior to shoulder but most weakening as shell increases in size, leaving just two cords anterior to shoulder; one smaller cord on siphonal canal. Where spiral cords cross axial ridges weak pointed knobs developed; otherwise, shell surface smooth. Suture appressed, sinuated by axial ridges. Aperture oval, marked anal channel; columellar lip smooth except for two small denticles at anterior end; inner side of outer lip with seven strong lirae extending well into aperture. Siphonal canal short, broad: siphonal fasciole increasing in width with increasing shell size. Traces of heavy intritacalx indicating that in life shell surface was covered by this chalky layer.

**Holotype:** USNM 498197; height 7.7 mm, diameter 4.9 mm (Figure 5).

**Type locality:** Chipola Formation; TU 458, east bank of

Chipola River, above Farley Creek (SW  $\frac{1}{4}$  sec. 20, T. 1 N, R. 9 W), Calhoun County, Florida.

**Paratype A:** USNM 498198; height 5.7 mm, diameter 3.7 mm; locality: TU 819 (Figure 6).

**Paratype B:** USNM 498199; height 9.3 mm, diameter 7.2 mm; locality: TU 819 (Figure 7).

**Occurrence:** Chipola Formation, TU localities 458, 547, 548, 817, 819, 999, 1196.

**Discussion:** For some time, we have had a dozen specimens of a small species taken from primarily coralline localities in the Chipola Formation, northwestern Florida. Obviously muricid, the exact generic placement was a puzzle until the discovery of *A. glenduffyi*, living off the shores of the Dominican Republic. This Recent form shares with the Chipola shell a marked anal channel and axial ornamentation consisting of rounded ribs but no true varices. However, *A. gretae* differs from *A. glenduffyi* in having a lower spire, a shorter siphonal canal, and a less appressed suture. Both species are small, although the Chipola form is slightly smaller, with a maximum size of 12 mm, but *A. glenduffyi* attains an adult size of approximately 15 mm. Although difficult to see in the photograph, paratype B shows typical *Attiliosa* nodules at the base of the columellar lip.

In addition to the Tulane material, there are four specimens in the private collection of Mr. and Mrs. Andrew Murray, of Bradenton, Florida. It is a pleasure to name this new species in honor of Greta (Mrs. Andrew) Murray, for her excellent work on the Chipola fauna, including collecting paratype B.

*Attiliosa gibsonsmithi* E. H. Vokes, sp. nov.

(Figures 10–13)

**Description:** Shell large for the genus (maximum height approximately 25 mm), inflated in outline. Protoconch of one and three-quarters smooth, bulbous whorls; six teleoconch whorls. Axial ornamentation of nine or 10 swollen axial ridges on each whorl. Spiral ornamentation very faint on early whorls, gradually increasing in strength and becoming three flattened cords on spire whorls; approximately six spiral cords on body whorl, that at base of body whorl the largest. Suture appressed, sinuated by axial ridges. Aperture round; inner lip smooth, appressed entire length; two weak nodules at anterior end. Margin of outer lip crenulated by spiral cords, a small projection formed by cord at base of body whorl; nine thin lirae extending far back into aperture. Siphonal canal short, broad; recurved at distal end, forming deep siphonal fasciole.

**Holotype:** NMB H-18084; height 19.2 mm, diameter 12.8 mm (Figure 10).

**Type locality:** Mataruca Member, Caujaro Formation; NMB 17530, Cementerio de Carrizal, Falcón, Venezuela.

**Paratype A:** NMB H-18085; height 20.4 mm, diameter 11.9 mm (Figure 11).

**Paratype B:** NMB H-18086; height 20.0 mm, diameter 12.3 mm (Figure 12).

**Paratype C:** NMB H-18087; height 14.3 mm, diameter 8.3 mm (Figure 13). Locality of all same as holotype.

**Occurrence:** All material from type locality.

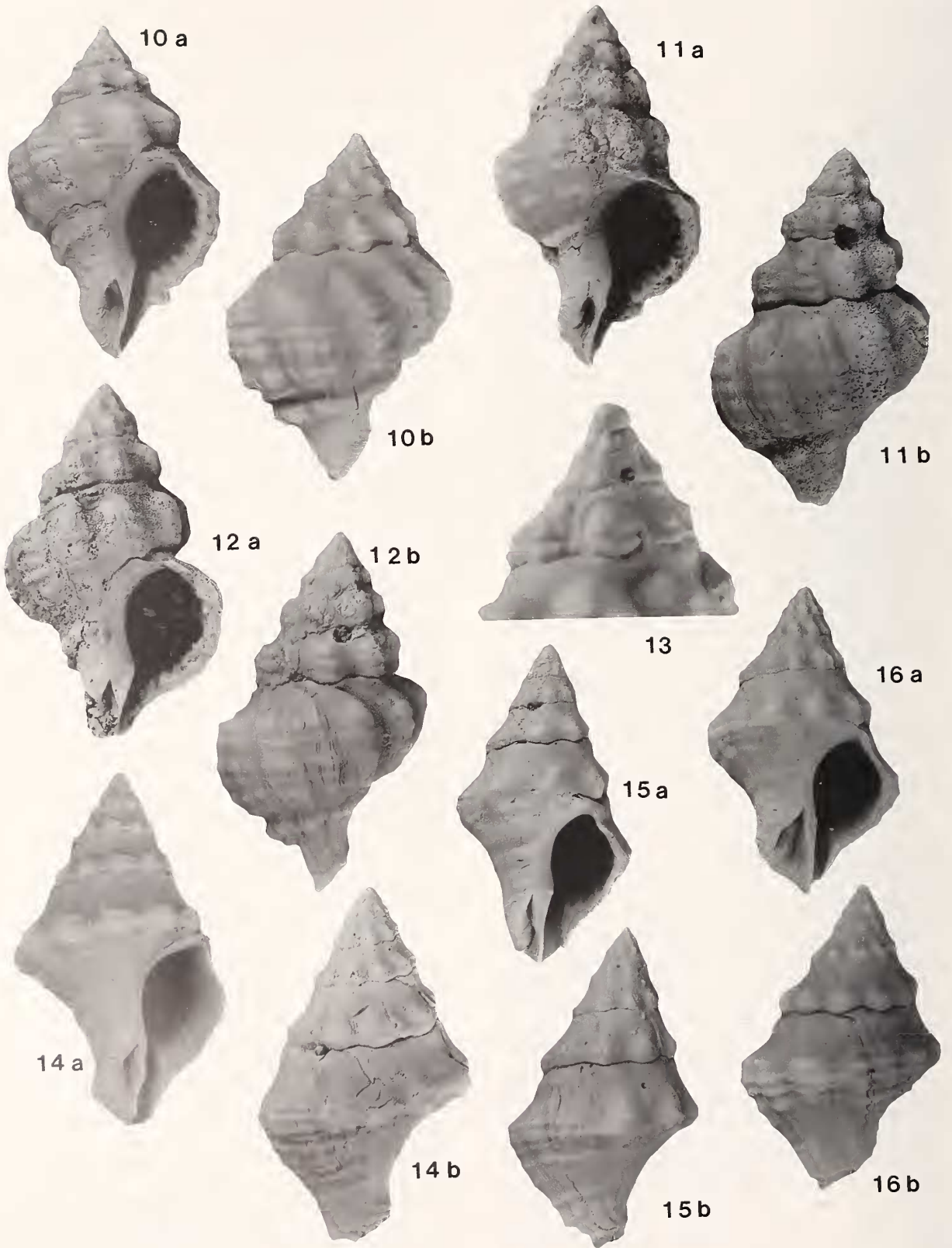
**Discussion:** In the collections of the Naturhistorisches Museum, Basel, Switzerland, there are 35 examples of a second new species, taken from Late Miocene aged beds of the Mataruca Member of the Caujaro Formation, Venezuela. This species also has been a puzzle for many years. The type material was originally sent to me by the collectors, Mr. and Mrs. Jack Gibson Smith, then of Caracas, Venezuela, now of Surrey, England. But neither they nor I could come up with any unequivocal generic placement for the form. With the recognition of Cossmann & Peyrot's *Taurasia sacyi* as a member of *Attiliosa*, similarity to the Venezuelan material indicated placement here might also be appropriate. Morphologically, they both have a strong basal cord, separated from the body whorl, which has rounded axial ribs but no true varices. The suture is sinuated by the axial ribs, and the aperture is strongly lirate within. But *A. sacyi* is much smaller and more evenly biconic in outline, *A. gibsonsmithi* having more inflated whorls.

In the living fauna the species most nearly akin to *A. gibsonsmithi* is that found off the west coast of tropical America, *A. nodulosa* (Adams), which differs from the older species in having a more appressed suture. So, possibly, *A. sacyi* gave rise to *A. gibsonsmithi*, which in turn gave rise to *A. nodulosa*, forming a species-complex long separate from the other Atlantic species. If *A. sacyi* also gave rise, independently, to the *A. philippiana* line, this would explain the similarity between the Pacific *A. nodulosa* and the Atlantic *A. philippiana*.

*Attiliosa macgintyi* E. H. Vokes, sp. nov.

(Figures 14–16)

**Description:** Shell biconic in outline; six teleoconch whorls in adult, early whorls unknown. Axial ornamentation of 11 or 12 rounded ridges on each teleoconch whorl. Spiral ornamentation of low raised cords, only two visible on spire whorls; approximately three on body whorl and three on siphonal canal, but number varying greatly between specimens. Where spiral cords cross axial ridges small nodes developed, otherwise shell surface smooth. Suture appressed, undulated by axial cords; shoulder very sloping. Aperture diamond-shaped, slight anal channel at posterior end. Columellar lip smooth, ap-



pressed posteriorly, free-standing anteriorly; two small nodules at anterior end. Inner side of outer lip with seven lirae extending well into aperture. Siphonal canal short, broad, recurved at distal end; deep siphonal fasciole.

**Holotype:** UF 90727; height 24.3 mm, diameter 14.7 mm (Figure 14).

**Type locality:** Tamiami Formation; UF CR007 (= TU 797), material exposed during construction of "Alligator Alley," 13.3 miles east of Florida Highway 29 (T. 49 S, R. 32 E) Collier County, Florida.

**Paratype A:** UF 90728; height 21.8 mm, diameter 12.8 mm (Figure 15).

**Paratype B:** UF 90729; height 20.9 mm, diameter 13.6 mm (Figure 16).

**Locality:** of both same as holotype.

**Occurrence:** All material from type locality.

**Discussion:** In the collection of the late Tom McGinty, Palm Beach, Florida, now located at the Florida Museum of Natural History, there are three examples of a new species originally taken from exposures of the Tamiami Formation available during construction of "Alligator Alley" (Florida Highway 84), southern Florida. Unfortunately, the three known specimens are badly worn, and details of early whorls are lacking. These shells bear some resemblance to the Recent *A. philippiana*, but differ in having a striking expansion at the periphery, a less appressed suture, and a somewhat larger size. The new species attains a maximum size of about 25 mm in contrast to a maximum of under 20 mm for *A. philippiana*. The overall outline of the shell is much closer to that of the Middle Miocene *A. sacyi*, suggesting that this new form is intermediate between the latter and *A. philippiana*.

*Attiliosa aldridgei* (Nowell-Usticke, 1969)

(Figures 17–25)

*Vasum aldridgei* Nowell-Usticke, 1969:18, pl. 4, fig. 834.

*Attiliosa aldridgei* (Nowell-Usticke). Nowell-Usticke, 1971:

11, pl. 2, fig. 680; Vokes & D'Attilio, 1982:69, figs. 6–9; Vokes, 1989:62, pl. 6, figs. 9, 10; Vokes, 1992:93, pl. 20, figs. 5–8; Houart, 1993a:21, fig. 14.

**Holotype:** American Museum of Natural History, no. AMNH 189620; height 29.4 mm, diameter 20.0 mm.

**Type locality:** Rat Island, Antigua, B.W.I.

**Fossil occurrences:** TU localities 283, 727 (Bermont Formation); 1215 (Gurabo Formation), 1422 (Cercado Formation); 1240 (Moín Formation).

**Figured specimens:**

Figure 17. AMNH 168901 (Paratype); height 22.4 mm, diameter 14.0 mm; locality: Antigua, B.W.I.

Figure 18. USNM 890890; height 29.7 mm, diameter 18.3 mm; locality: Bimini, B.W.I., 10 meters.

Figure 19. USNM 792393; height 12.3 mm, diameter 8.2 mm; locality: Bimini, B.W.I., 10 meters.

Figure 20. USNM 890891; height 16.4 mm, diameter 10.5 mm; locality: Discovery Bay, Jamaica, 10 meters.

Figure 21. USNM 869515; height 19.1 mm, diameter 12.8 mm; locality: TU R-369, Moín, Costa Rica.

Figure 22. USNM 498200; height 20.1 mm, diameter 11.7 mm; locality: TU 1422, Cercado Formation.

Figure 23. USNM 890892; height 20.7 mm, diameter 12.4 mm; locality: TU R-109, Bahia de Las Minas, Panama.

Figure 24. USNM 890893; height 15.1 mm, diameter 9.2 mm; locality: Cartagena, Colombia.

Figure 25. USNM 323924; height 10.8 mm, diameter 6.9 mm; locality: TU 1240, Moín Formation.

**Discussion:** For a complete synonymy of citations prior to 1982, see Vokes & D'Attilio (1982:69). At that time, the species was known from a relatively few individuals, collected from Bimini, B.W.I. to Panama. Since that original discussion we have obtained numerous additional Recent specimens from other Caribbean Recent localities, and several fossil examples, especially from the coral-reefs of the Cercado and Gurabo formations (Mio-Pliocene) of the Dominican Republic, as well as the Caloosahatchee and Bermont formations of Florida.

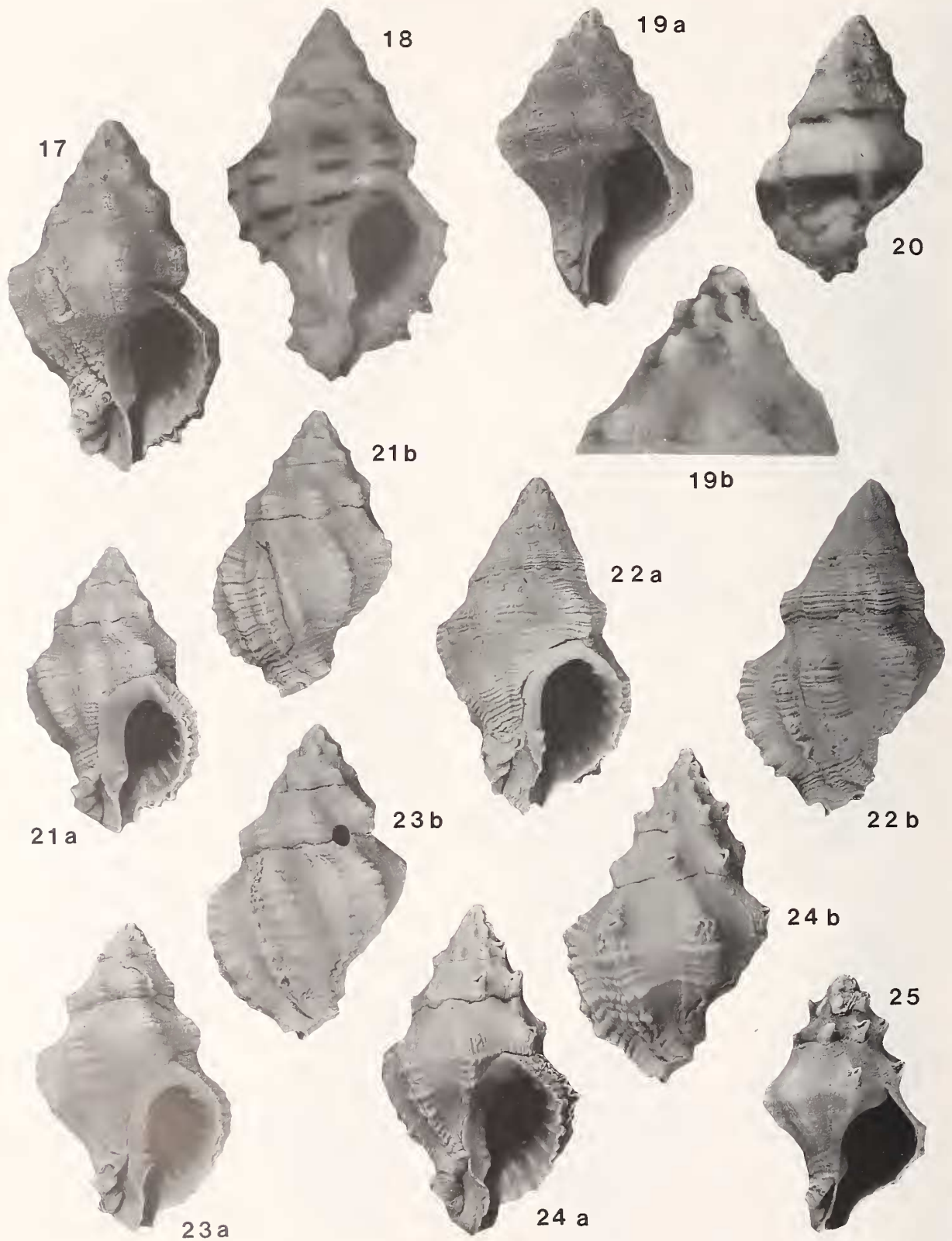
There is a fair degree of variability in the overall mor-

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Explanation of Figures 10 to 16

Figures 10–13. *Attiliosa gibsonsmithi* E. H. Vokes, sp. nov. Figure 10a, b. NMB H-18084 (Holotype); height 19.2 mm, diameter 12.8 mm; locality: NMB 17530, Mataruca Member, Caujaro Formation. ×3. Figure 11a, b. NMB H-18085 (Paratype A); height 20.4 mm, diameter 11.9 mm; locality: same as holotype. ×3. Figure 12a, b. NMB H-18086 (Paratype B); height 20.0 mm, diameter 12.3 mm; locality: same as holotype. ×3. Figure 13. NMB H-18087 (Paratype C); height 14.3 mm, diameter 8.3 mm; locality: same as holotype. ×10.

Figures 14–16. *Attiliosa macgintyi* E. H. Vokes, sp. nov. Figure 14a, b. UF 90727 (Holotype); height 24.3 mm, diameter 14.7 mm; locality: UF CR007 (= TU 797), Tamiami Formation. ×2.5. Figure 15a, b. UF 90728 (Paratype A); height 21.8 mm, diameter 12.8 mm; locality: same as holotype. ×2.5. Figure 16a, b. UF 90729 (Paratype B); height 20.9, diameter 13.6 mm; locality: same as holotype. ×2.5.





phology of this species. Some specimens are low-spined and "chunky" (e.g., Figures 21 and 23), and some have a higher spire, with an impressed suture, which gives a "stepped" appearance to the shell (e.g., Vokes & D'Attilio, 1982:fig. 7). Although the two "chunky" examples figured here both come from the southern Caribbean, there does not seem to be any particular geographic distribution to the differences. In the Mio-Pliocene beds of the Dominican Republic, both forms occur together (compare Vokes, 1989:pl. 6, figs. 9, 10). The southern forms have a more lirate aperture and also are more spinose in the younger stages (compare Figure 19 with Figures 24, 25). Given the similarity of the adult specimens, there seems little reason to separate the southern form as a distinct species from the more northern typical examples, but rather to accept them as the end members of a single cline.

The typical form is ornamented by thin brown lines topping the spiral cords (Figure 18), but some specimens have a single broad color broad at the periphery (Figure 20). This latter color morph was named *Muricopsis poeyi* by Sarasúa & Espinosa (1979:2, fig. 1; holotype refigured by Vokes & D'Attilio, 1982:fig. 10). The only examples I have seen with such a pattern come from the Greater Antilles, and this may be a geographic variation.

*Attilosa nodulosa* (A. Adams, 1855)

(Figures 3, 4)

*Peristernia nodulosa* A. Adams, 1855:313.

*Coralliophila incompta* Berry, 1960:119.

*Attilosa nodulosa* (Adams). Vokes & D'Attilio, 1982:69; Vokes, 1988:33, pl. 6, figs. 5, 6.

**Syntypes:** The Natural History Museum, London [British Museum (Natural History)]; see Bullock, 1976:pl. 1, figs. 6, 8.

**Type locality:** "Australia."

**Fossil occurrence:** Esmeraldas beds, Onzole Formation, TU locality 1399.

**Figured specimens:**

Figure 3. USNM 418059; height 25.7 mm, diameter 16.6 mm; locality: TU 1399, Esmeraldas beds, Onzole Formation.

Figure 4. USNM 859927; height 31.5 mm, diameter 19.0 mm; locality: TU R-487, Guaymas, Sonora, Mexico.

**Discussion:** For a complete synonymy and discussion of the convoluted nomenclatorial history of this species, which is the type of the genus *Attiliosa*, see Vokes & D'Attilio (1982:69). Discovery of a fossil specimen in the Early Pliocene Esmeraldas beds, Onzole Formation, of northwestern Ecuador (Vokes, 1988:pl. 6, fig. 6; refigured here, Figure 3), reveals a considerable geologic history for the eastern Pacific species.

RECENT SPECIES

*Attiliosa glenduffyi* Petuch, 1993

(Figures 8, 9)

*Attiliosa* sp. Vokes, 1992:95, pl. 20, figs. 10, 11.

*Attiliosa glenduffyi* Petuch, 1993:54, figs. 6, 7.

**Holotype:** Carnegie Museum of Natural History; height 13 mm, diameter 9 mm (*vide* Petuch, 1993:54).

**Type locality:** Samana, Dominican Republic.

**Figured specimens:**

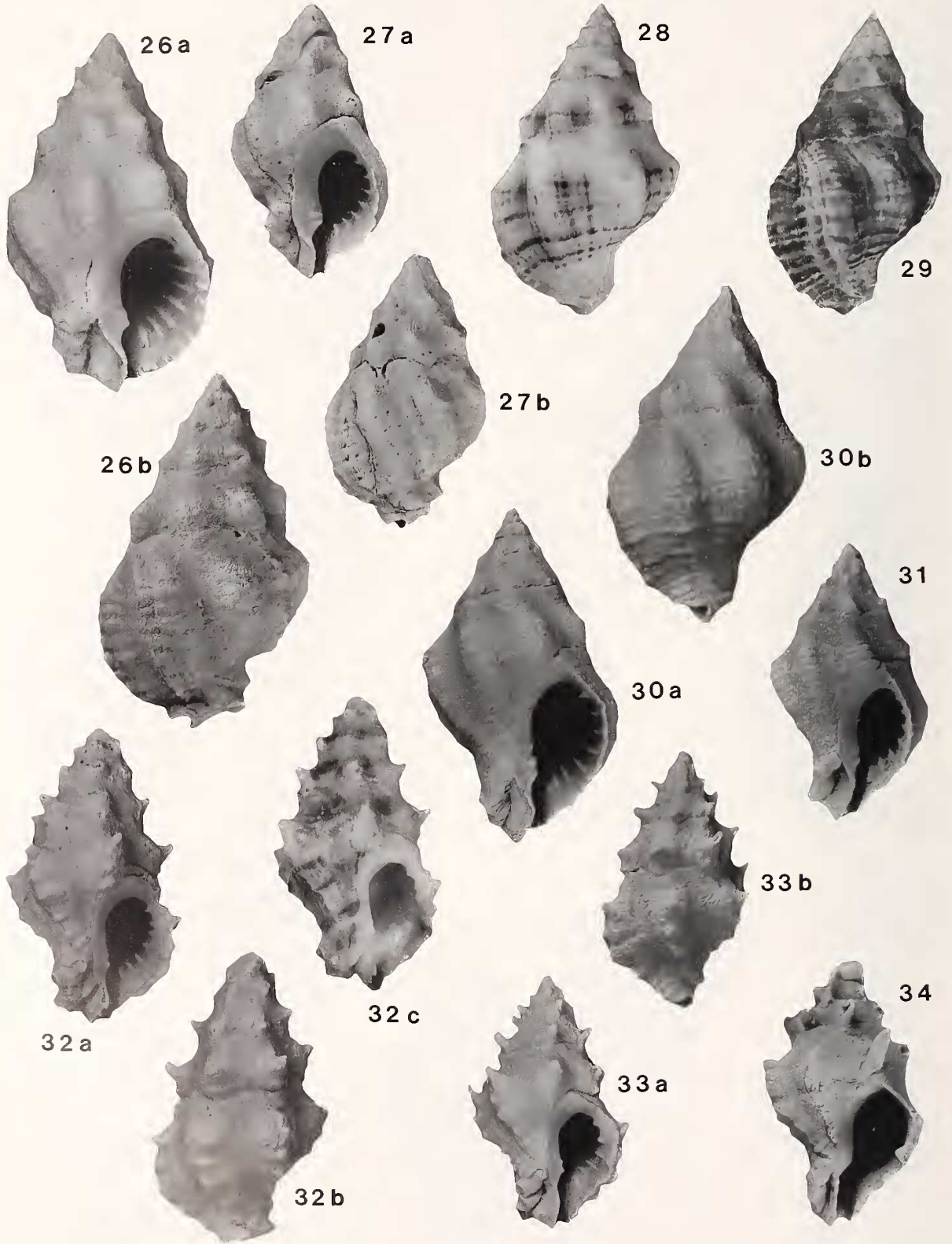
Figure 8. USNM 860299; height 13.9 mm, diameter 8.0 mm; locality: Dominican Republic.

Figure 9. USNM 860298; height 14.3 mm, diameter 9.2 mm; locality: Dominican Republic.

**Discussion:** This recently described western Atlantic addition to the genus is unique in having a strong color pattern, consisting of a dark brown shell with a white band circling the periphery. As suggested above, it is more similar to the *Chipola A. gretae* than to the other living forms and may well represent a different species-complex altogether. At this time, the species is known only from the vicinity of the type locality, where it occurs on and under rocks and coral rubble in depths of 1–5 meters (Petuch, 1993:54).

Explanation of Figures 17 to 25

Figures 17–25. *Attiliosa aldridgei* (Nowell-Usticke, 1969). Figure 17. AMNH 168901 (Paratype); height 22.4 mm, diameter 14.0 mm; locality: Antigua, B.W.I. ×2.5. Figure 18. USNM 890890; height 29.7 mm, diameter 18.3 mm; locality: Bimini, B.W.I., 10 meters (shell not whitened, to show color pattern). ×2. Figure 19a, b. USNM 792393; height 12.3 mm, diameter 8.2 mm; locality: Bimini, B.W.I., 10 meters. Figure 19a ×4; 19b ×10. Figure 20. USNM 890891; height 16.4 mm, diameter 10.5 mm; locality: Discovery Bay, Jamaica, 10 meters (shell not whitened, to show color pattern). ×2.5. Figure 21a, b. USNM 869515; height 19.1 mm, diameter 12.8 mm; locality: TU R-369, Moín, Costa Rica. ×2.5. Figure 22a, b. USNM 489200; height 20.1 mm, diameter 11.7 mm; locality: TU 1422, Cercado Formation. ×2.5. Figure 23a, b. USNM 890892; height 20.7 mm, diameter 12.4 mm; locality: TU R-109, Bahía de Las Minas, Panama. ×2.5. Figure 24a, b. USNM 890893; height 15.1 mm, diameter 9.2 mm; locality: Cartagena, Colombia. ×4. Figure 25. USNM 323924; height 10.8 mm, diameter 6.9 mm; locality: TU 1240, Moín Formation. ×4.



*Attiliosa philippiana* (Dall, 1889)

(Figures 30, 31)

*Muricidea philippiana* Dall, 1889:213; 1902:504, pl. 29, fig. 5.*Attiliosa aldrigei* (Nowell-Usticke). Vokes, 1976:in part, pl. 8, fig. 10 only.*Attiliosa philippiana* (Dall). Vokes & D'Attilio, 1982:69; Vokes, 1992:94, pl. 20, fig. 9.

**Lectotype:** United States National Museum of Natural History, no. USNM 93337; height 14.9 mm, diameter 8.8 mm.

**Type locality:** U.S. Fish Commission Station 2362, off Cabo Catoche, Quintana Roo, Mexico, in 25 fathoms [46 meters].

**Figured specimens:**

Figure 30. USNM 890894; height 14.8 mm, diameter 8.5 mm; locality: San Andres Island, Colombia, 15 meters.

Figure 31. USNM 711114; height 10.6 mm, diameter 6.0 mm; locality: TU R-98, Holandes Cay, Panama.

**Discussion:** For a complete synonymy and history of this misunderstood species, see Vokes & D'Attilio (1982:69). In that discussion it was not noted that one of the specimens figured by Vokes (1976:pl. 8, fig. 10; refigured here, Figure 31) as *A. aldrigei* is actually a juvenile example of *A. philippiana*. Perhaps the misidentification was a result of the belief held at the time that *A. philippiana* was found only in the Florida-Yucatan portion of the western Atlantic (Vokes, 1976:122). But several larger examples (Figure 30) from San Andres Island, taken in 15 meters by SCUBA diver, confirm the presence of this species in the southern Caribbean.

*Attiliosa bessei* E. H. Vokes, sp. nov.

(Figures 26–29)

**Description:** Early whorls unknown, all material badly eroded. At least six teleoconch whorls. Axial ornamentation of six or seven rounded ridges on each teleoconch

whorl. Spiral ornamentation very faint, approximately eight cords on body whorl. Suture appressed, sinuated by axial ridges; shoulder sloping. Aperture rounded; columellar lip appressed at posterior end, free-standing at anterior end; smooth except for two or three elongate nodules at anterior end. Outer lip patulous, margin serrated by almost invisible spiral cords, with small adaperturally directed points corresponding to grooves between spiral cords. About seven strong lirae on inner side of outer lip. Siphonal canal short, broad; recurved at distal end, forming a deep, wide siphonal fasciole. Shell invariably coated with coralline algae; when removed, color pattern revealed as variable brown lines topping spiral cords.

**Holotype:** USNM 880260; height 24.6 mm, diameter 14.5 mm (Figure 26).

**Type locality:** Rosalind Bank, Bay Islands, Honduras, from 30 meters in lobster traps.

**Paratype A:** USNM 880261; height 18.8 mm, diameter 11.0 mm; locality same as holotype (Figure 27).

**Paratype B:** USNM 880262; height 21.6 mm, diameter 12.7 mm; locality: Gorda Banks, Bay Islands, Honduras, from lobster traps (Figure 28).

**Paratype C:** USNM 880263; height 21.0 mm, diameter 11.9 mm; locality: Gorda Banks, Bay Islands, Honduras, from lobster traps (Figure 29).

**Discussion:** From the vicinity of the Bay Islands, Honduras, there is a species that is closely related to the more widespread *A. aldrigei*. However, this new species differs from the latter in having a higher spire and shorter siphonal canal, so that the outline of the shell is biconic with the shoulder knobs at the midpoint of the shell height. It is totally lacking in spines, and the color pattern varies from white with numerous thin brown spiral lines (Figure 28) to brown with thin white spiral lines (Figure 29).

This new species is named in honor of Mr. Bruno Bes-

←

## Explanation of Figures 26 to 34

Figures 26–29. *Attiliosa bessei* E. H. Vokes, sp. nov. Figure 26a, b. USNM 880260 (Holotype); height 24.6 mm, diameter 14.5 mm; locality: Rosalind Bank, Bay Islands, Honduras. ×2.5. Figure 27a, b. USNM 880261 (Paratype A); height 18.8 mm, diameter 11.0 mm; locality: Rosalind Bank, Bay Islands, Honduras. ×2.5. Figure 28. USNM 880262 (Paratype B); height 21.6 mm, diameter 12.7 mm; locality: Gorda Bank, Bay Islands, Honduras (shell not whitened, to show color pattern). ×2.5. Figure 29. USNM 880263 (Paratype C); height 21.0 mm, diameter 11.9 mm; locality: Gorda Bank, Bay Islands, Honduras (shell not whitened, to show color pattern). ×2.5.

Figures 30 and 31. *Attiliosa philippiana* (Dall, 1889). Figure 30a, b. USNM 890894; height 14.8 mm, diameter 8.5 mm; locality:

San Andres Island, Colombia, 15 meters. ×4. Figure 31. USNM 711114; height 10.6 mm, diameter 6.0 mm; locality: TU R-98, Holandes Cay, Panama. ×4.

Figures 32–34. *Attiliosa kevani* E. H. Vokes, sp. nov. Figure 32a–c. USNM 880264 (Holotype); height 17.9 mm, diameter 11.0 mm; locality: Montego Bay, Jamaica (shell in Fig. 32c not whitened, to show color pattern). ×3. Figure 33a, b. USNM 880265 (Paratype A); height 15.2 mm, diameter 10.1 mm; locality: Montego Bay, Jamaica. ×3. Figure 34. USNM 880266 (Paratype B); height 7.4 mm, diameter 4.3 mm; locality: Utila, Bay Islands, Honduras, 25 meters. ×6.

se, diver in the Bay Islands, who provided much of the available material.

*Attiliosa kevani* E. H. Vokes, sp. nov.

(Figures 32–34)

*Muricopsis pudicus* (Reeve). Humfrey, 1975:138, pl. 16, fig. 7 (not of Reeve).

*Attiliosa aldridgei* (Nowell-Usticke). Vokes, 1992:in part, discussion p. 93 only.

**Description:** Shell small for genus (maximum height under 18 mm); spire high. Protoconch of one and one-half flattened and tilted whorls (cf. Radwin & D'Attilio, 1976: text-fig. 58—*Prototyphis angasi*); six teleoconch whorls. Axial ornamentation beginning with five small varices on first two teleoconch whorls, increasing to six or seven on later whorls. On first three ornamented whorls each varix with a long, adapically recurved spine at shoulder; spines continuing on later whorls but not as long relative to shell size. No spiral ornamentation visible on spire whorls; on body whorl four faint spiral cords between shoulder and base of whorl; except for varices shell surface almost smooth. Suture appressed, sinuated by varices; shoulder extremely sloping, resulting in spire being almost one-half entire shell height. Aperture rounded, columellar lip expanded and appressed; smooth except for two elongate nodules at anterior end. Outer lip patulous; margin serrated with small adaperturally directed points corresponding to grooves between spiral cords, in immature specimens that one at base of body whorl forming a small sinusigeral projection. Six or seven strong lirae set back from margin of outer lip, extending far into aperture. Siphonal canal short, broad; reflected at distal end, forming a small siphonal fasciole. Color white, with vague brown lines topping spiral cords; some specimens also with broad brown band on shoulder and base of body whorl.

**Holotype:** USNM 880264; height 17.9 mm, diameter 11.0 mm (Figure 32).

**Type locality:** Montego Bay, Jamaica, 25 meters.

**Paratype A:** USNM 880265; height 15.2 mm, diameter 10.1 mm; locality: Montego Bay, Jamaica, 25 meters (Figure 33).

**Paratype B:** USNM 880266; height 7.4 mm, diameter 4.3 mm; locality: Utila, Bay Islands, Honduras, 25 meters (Figure 34).

**Discussion:** In a previous discussion of *A. aldridgei*, I stated (Vokes, 1992:93) that the specimen figured by Humfrey (1975:pl. 16, fig. 7) as *Muricopsis pudicus* (Reeve) was certainly not that species, which is a West African *Hexaplex*, but was simply a spinose juvenile specimen of *A. aldridgei*. Furthermore, I noted that in the collection of Kevan and Linda Sunderland, Sunrise, Florida, there were similar juvenile examples taken from 12 to 25 meters depth in the Bay Islands. Since that time numerous adult specimens have been taken by the Sunderlands in both the Bay Islands and Jamaica, and it is now clear that this is a new species, resembling *A. aldridgei* only in the juvenile stages but very different in the adult. According to Mr. Sunderland, this form is always found in old dead reef systems, on algae and always very encrusted with lime, as is typical of other members of the genus *Attiliosa*.

From *A. aldridgei* the new species differs in being smaller (the holotype at just under 18 mm is by far the largest specimen seen) and more spinose. The outline of the shell is less inflated in *A. kevani* and the spire is much higher—almost one-half the total height of the shell.

From the other new species, *A. bessei*, *A. kevani* differs in much the same ways, with *A. bessei* being even less spinose than *A. aldridgei*.

*Attiliosa perplexa* E. H. Vokes, sp. nov.

(Figures 35–37)

**Description:** Shell small for genus (maximum height 12 mm), biconic in outline. Protoconch of one and one-half

→

Explanation of Figures 35 to 43

Figure 35–37. *Attiliosa perplexa* E. H. Vokes, sp. nov. Figure 35a, b. USNM 880257 (Holotype); height 12.6 mm, diameter 6.8 mm; locality: off Guarapari, Espirito Santo, Brazil, under rocks at 20 meters. ×4. Figure 36a, b. USNM 880258 (Paratype A); height 10.7 mm, diameter 6.3 mm; locality: same as holotype. ×4. Figure 37a, b. USNM 880259 (Paratype B); height 11.4 mm, diameter 6.3 mm; locality: Rasa Island, off Guarapari, Espirito Santo, Brazil, dredged in 30 meters. ×4.

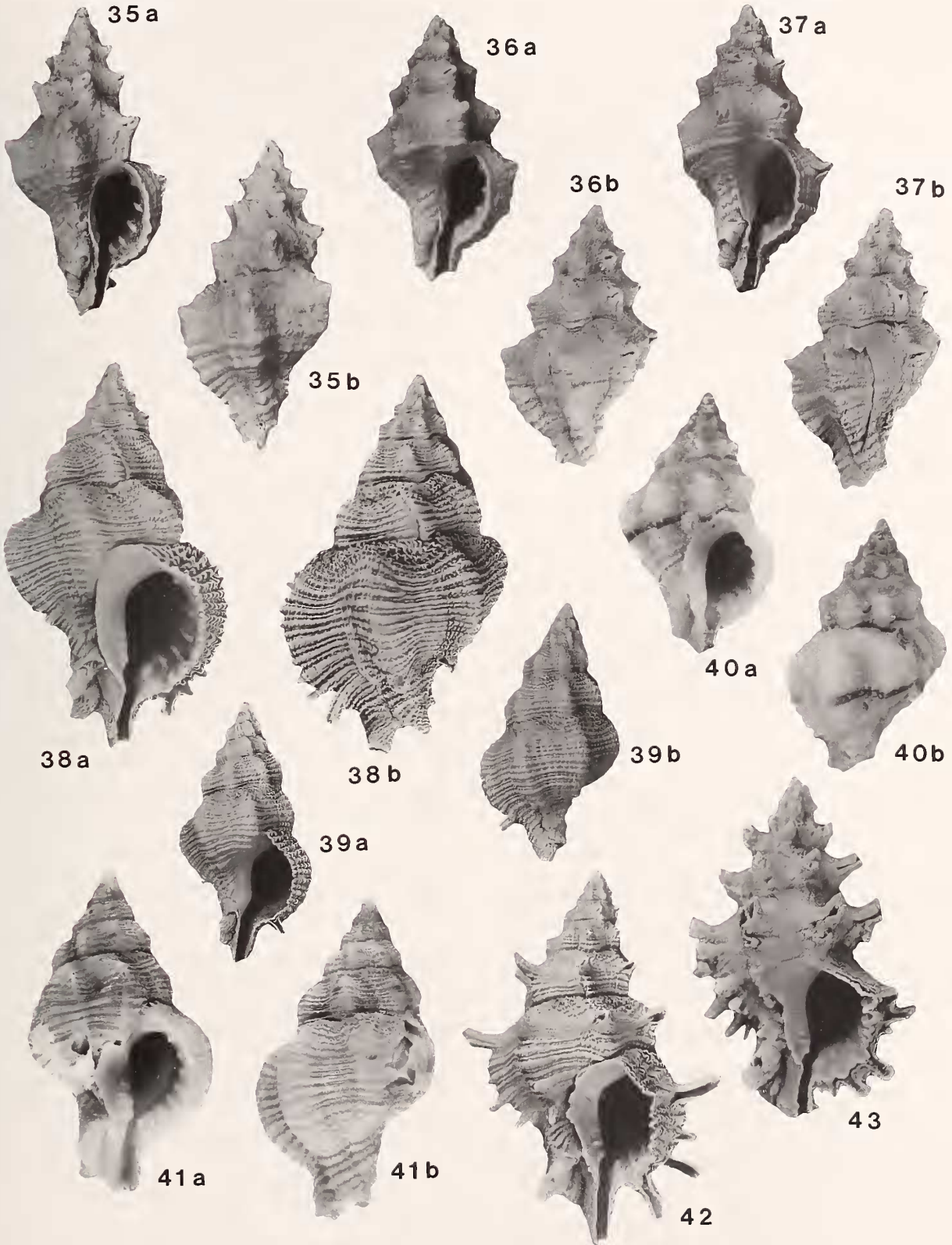
Figures 38 and 39. *Attiliosa houarti* E. H. Vokes, sp. nov. Figure 38a, b. USNM 880255 (Holotype); height 23.5 mm, diameter 12.9 mm; locality: Phuket, Thailand, 30 meters. ×2.5. Figure 39a, b. USNM 880256 (Paratype); height 15.7 mm, diameter 8.3 mm; locality: Kor Bon Island, western Thailand, 12 meters. ×3.

Figure 40a, b. *Attiliosa goreensis* Houart, 1993. MNHN (Holotype); height 14.2 mm, diameter 9.0 mm; locality: Gorée, Senegal, 20–25 meters. ×3.

Figure 41a, b. *Attiliosa bozzettii* Houart, 1993 IRSNB IG27.873/454 (Holotype); height 17.0 mm, diameter 10.1 mm; locality: Ras Hafun, Somalia, 150–200 meters. ×3.

Figure 42. *Attiliosa orri* (Cernohorsky, 1976). USNM 890895; height 30.9 mm; diameter 22.7 mm (including spines); locality: Kantang, Thailand. ×2.

Figure 43. *Attiliosa nodulifera* (Sowerby, 1841). SDSHN 78076a; height 29.0 mm, diameter 20.1 mm; locality: Ataa, Malaita, Solomon Islands. ×2.



smooth, bulbous whorls; six teleoconch whorls. Axial ornamentation of six rounded ridges on each whorl. Spiral ornamentation of flattened cords; four on spire whorls between shoulder and suture; on body whorl two major cords, one at shoulder, one at periphery, approximately 12 secondary cords. Where two major cords cross axial ridges open spines produced, that at shoulder much larger; small open flanges at minor cords. Suture incised; undulated by axial ridges. Aperture elongate-oval; inner lip smooth, appressed; one small nodule at anterior end. Margin of outer lip extended, scalloped by spiral cords; five strong lirae on inner side. Siphonal canal short, broad; recurved at distal end, forming small siphonal fasciole. Outer surface of shell covered by intritacalx; when removed, a single brown spiral band visible at base of body whorl.

**Holotype:** USNM 880257; height 12.6 mm, diameter 6.8 mm (Figure 35).

**Type locality:** Off Guarapari, Espirito Santo, Brazil, under rocks at 20 meters.

**Paratype A:** USNM 880258; height 10.7 mm, diameter 6.3 mm; locality same as holotype (Figure 36).

**Paratype B:** USNM 880259; height 11.4 mm, diameter 6.3 mm; Rasa Island, off Guarapari, Espirito Santo, dredged in 30 meters (Figure 37).

**Discussion:** From off the coast of Espirito Santo, Brazil, José and Marcus Coltro have collected a number of specimens of a small species that, although obviously muricine, seemed to defy placement in any recognized genus. The perplexing question of the generic assignment of this unusual new species was first resolved by Mr. Roland Houart, who recognized that *Attiliosa* might be the proper assignment (1995, personal communication). However, in terms of other known members of *Attiliosa*, there is none that bears more than a generic resemblance. The shell is the most attenuated of all *Attiliosa* species, with the height:width ratio more than 2:1. The narrow shell, with a few relatively strong spiral cords, and small size (maximum height about 12 mm) suggests a relationship with the French Miocene *A. sacyi*, and therefore, the species is tentatively included with that species-complex.

*Attiliosa goreensis* Houart, 1993

(Figure 40)

*Attiliosa goreensis* Houart, 1993a:20, figs. 11, 12 (holotype), 13 (paratype), 18, 19 (radula), 26, 27 (protoconch).

**Holotype:** Muséum National d'Histoire Naturelle, Paris; height 14.2 mm, diameter 9.0 mm.

**Type locality:** Gorée, Senegal, 20–25 meters.

**Figured specimen:** Holotype (photograph courtesy of Roland Houart).

**Discussion:** As noted in the original description (Houart, 1993a:21), this species is most closely related to *A. aldridgei* but differs in having more shouldered whorls, with more regular and equi-sized spiral cords. It is also smaller, attaining a maximum size of approximately 15 mm. Interestingly, the holotype (Figure 40) shows a brown spiral band on the body whorl similar (although narrower) to the color form described as *A. poeyana* (cf. Figure 20).

*Attiliosa houarti* E. H. Vokes, sp. nov.

(Figures 38, 39)

**Description:** Early whorls unknown, seven teleoconch whorls in adult. Axial ornamentation of six or seven rounded ridges on each teleoconch whorl and multiple growth lamellae covering entire surface of shell. No varical break visible until adult body whorl. Spiral ornamentation of raised cords alternating with smaller threads; approximately 12 major cords on body whorls plus six smaller threads on siphonal canal. Intersection of spiral ornament and growth lamellae giving rise to a scabrous shell surface; on adapertural side of axial ridges lamellae forming small open flanges; that formed by cord at base of body whorl strongest. Suture slightly appressed. Aperture rounded; columellar lip greatly expanded and appressed at posterior end, free-standing at anterior end; smooth, with three small nodules at anterior end. Margin of outer lip serrated by spiral ornamentation, seven elongate nodules on inner side. Siphonal canal short, broad; extremely recurved at distal end with terminations of axial ridges forming small spurs encircling a deep siphonal fasciole. Color uniformly brown; aperture white.

**Holotype:** USNM 880255; height 23.5 mm, diameter 12.9 mm (Figure 38).

**Type locality:** Phuket, Thailand, in rubble, 30 meters.

**Paratype:** USNM 880256; height 15.7 mm, diameter 8.3 mm; Kor Bon Island, western Thailand, 12 meters (Figure 39).

**Discussion:** Most closely related to *A. bozzettii* Houart, described from the opposite side of the Indian Ocean, *A. houarti* differs from the latter in having a larger aperture and shorter siphonal canal. Both differ from the third Indian Ocean species, *A. orri*, in lacking the extreme development of varical spines seen in that form. Nevertheless, these three Indian Ocean species are more similar to the Atlantic species of the “*A. aldridgei* group” than to the species in the Pacific Ocean.

*Attiliosa bozzettii* Houart, 1993

(Figure 41)

*Attiliosa bozzettii* Houart, 1993b:42, figs. 1, 2 (holotype), 3 (paratype), 9 (protoconch).

**Holotype:** Institut Royal des Sciences Naturelles de Belgique, no. IG27.873/454; height 17.0 mm, diameter 10.1 mm.

**Type locality:** Ras Hafun, Somalia, 150–200 meters.

**Figured specimen:** Holotype (photograph courtesy of Roland Houart).

**Discussion:** There is a strong similarity between three Indian Ocean species of *Attiliosa*. Of these, *A. orri* is the most spinose, *A. houarti* is slightly spinose, and *A. bozzettii* is completely non-spinose. All three share an extremely squamose surface ornamentation. A fourth species, *A. edingeri* Houart, 1998, recently described from the Indian Ocean side of Australia does not seem to be closely related to these three species but rather is a member of the *A. nodulosa* complex.

*Attiliosa orri* (Cernohorsky, 1976)

(Figure 42)

*Muricopsis orri* Cernohorsky, 1976:116, figs. 12–20.

*Attiliosa orri* (Cernohorsky). Vokes & D'Attilio, 1982:71.

**Holotype:** Auckland Institute and Museum, no. TM-1346; height 27.1 mm, diameter 18.6 (spines excluded).

**Type locality:** Andaman Islands, Indian Ocean, in 55 meters.

**Figured specimen:** USNM 890895; height 30.9 mm; diameter 22.7 mm (including spines); locality: Kantang, Thailand.

**Discussion:** For a complete synonymy see Vokes & D'Attilio (1982:71).

*Attiliosa nodulifera* (Sowerby, 1841)

(Figure 43)

*Murex noduliferus* Sowerby, 1841a:8, pl. 194, fig. 94; 1841b:147.

*Murex (Trophon) fruticosus* Gould, 1849:143.

*Murex pagodus* A. Adams, 1853:269.

*Attiliosa nodulifera* (Sowerby). Vokes & D'Attilio, 1982:70, in part, figs. 1–4 (only); D'Attilio & Myers, 1986:62, figs. 8, 9; Houart, 1996:61, fig. 16.

**Syntypes:** The Natural History Museum, London [British Museum (Natural History)], nos. 1842.5.10 (1618–1619); height of larger (figured by Cernohorsky, 1976: figs. 22, 23) height 20.2 mm, diameter 12.8 mm.

**Type locality:** Masbate, Philippine Islands.

**Figured specimen:** SDSNH 78076a; height 29.0 mm, diameter 20.1 mm; locality: Ataa, Malaita, Solomon Islands.

**Discussion:** According to Cernohorsky (1976:119), the original illustration of *Murex noduliferus* Sowerby, 1841,

is a composite of the two syntypes, a worn mature example (figured by Cernohorsky) and an immature specimen, which better shows the spines.

*Attiliosa caledonica* (Jousseaume, 1881)

*Muricidea caledonica* Jousseaume, 1881:349; 1882:345.

*Murex (Muricidea) caledonica* (Jousseaume). Poirier, 1883: 110, pl. 5, fig. 3 (lectotype; designated by Fischer-Piette and Beigbeder, 1943:206).

"*Muricidea*" *caledonica* (Jousseaume). Vokes & D'Attilio, 1982:68, fig. 5 ("lectotype").

*Attiliosa caledonica* (Jousseaume). D'Attilio & Myers, 1986:59, figs. 1–7, 10 (fig. 4c = lectotype); Houart, 1996:61, fig. 17; Houart, 1998:96, fig. 31.

**Lectotype:** Muséum National d'Histoire Naturelle, Paris; height 26.2 mm, diameter 19.0 mm (*vide* D'Attilio and Myers, 1986: fig. 4c).

**Type locality:** New Caledonia.

**Discussion:** In our original discussion (Vokes & D'Attilio, 1982:68), we noted the differences between *A. nodulifera* and *A. caledonica* and concluded that the two forms were synonymous. However, D'Attilio & Myers (1986) have presented convincing evidence that the two are indeed distinct species. They also demonstrated that the specimen figured as "lectotype" by Fair (1976:pl. 17, fig. 229) and by Vokes & D'Attilio (1982:fig. 5) was not the specimen figured by Poirier (1883:pl. 5, fig. 3), which had previously been designated as lectotype by Fischer-Piette & Beigbeder (1943:206); in fact, it is not even part of the type lot.

For a complete synonymy of *A. caledonica* see Vokes & D'Attilio (1982:70).

*Attiliosa ruthae* Houart, 1996

*Attiliosa ruthae* Houart, 1996:61, figs. 15 (paratype), 31–32 (holotype).

**Holotype:** Muséum National d'Histoire Naturelle, Paris; height 27.5 mm, diameter 18.1 mm.

**Type locality:** Cebu, Philippine Islands.

**Discussion:** This recently described species is most similar to the sympatric *A. nodulifera* but has fringed varices rather than spines.

*Attiliosa edingeri* Houart, 1998

*Attiliosa edingeri* Houart, 1998:96, figs. 1, 2 (holotype), 3, 4 (paratypes), 40 (radula).

**Holotype:** Western Australian Museum, no. WAM S.1101; height 31.9 mm, diameter 18.1 mm.

**Type locality:** Off Esperance, Western Australia, 31–36 meters.

**Discussion:** This recently described species is, as noted

by Houart (1998:96), unlike any other known from the Indo-Pacific. In its non-varicate morphology it most nearly resembles the eastern Pacific *A. nodulosa* but differs in having a more scabrous surface ornamentation. The two are also similar in their relatively large size; the largest specimen of *A. edingeri* measures 35.7 mm in height (Houart, 1998:fig. 4), which is only a bit larger than the specimen here figured (Figure 4) of *A. nodulosa*.

**Acknowledgments.** This study is largely the result of material provided by other persons and I am grateful to all of the friends who contributed specimens and information. In particular, Kevan and Linda Sunderland, Sunrise, Florida, and José and Marcus Coltro, São Paulo, Brazil, have always been extremely generous with Caribbean and Brazilian material; without them this study would not have been possible. Mr. and Mrs. Jack Gibson Smith, Surrey, England, originally provided some of the Venezuelan material, which was later augmented by a loan from Peter Jung, Naturhistorisches Museum, Basel, Switzerland, where the Gibson Smith Collection is now housed. Roger Portell, Florida Museum of Natural History, Gainesville, Florida, sent the unknown specimens from the McGinty Collection for my examination, and Andrew and Greta Murray kindly shared their Chipola material for the new species from those beds. Roland Houart, Landen, Belgium, who loaned me the negatives of his new species of *Attiliosa* that I might reproduce them, over the years has been a valued collaborator in our joint attempts to bring some small degree of order to the Family Muricidae.

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#### LOCALITY DATA

The following are Tulane University fossil locality numbers:

283. Caloosahatchee Fm. and Bermont Fm. mixed, spoil banks on cross-canal 1.3 miles southwest of Port Charlotte Railroad Station (formerly Murdock) on south side of Florida Highway 771 and Seaboard Airline Railroad (Sec. 12, T. 40 S, R. 21 E), Charlotte County, Florida.
458. Chipola Fm., east bank of Chipola River, above Farley Creek (SW ¼ Sec. 20, T. 1 N, R. 9 W), Calhoun County, Florida.
547. Chipola Fm., west bank of Chipola River, about 2000 feet above Fourmile Creek (SW ¼ Sec. 29, T. 1 N, R. 9 W), Calhoun County, Florida.
548. Chipola Fm., west bank of Chipola River, at bend about 1800 feet south of mouth of Farley Creek (NW ¼ Sec. 29, T. 1 N, R. 9 W), Calhoun County, Florida.
727. Bermont Fm., borrow pits 2.2 miles east of U.S. Highway 27, 15 miles south of South Bay, Palm Beach County, Florida.
817. Chipola Fm., south side of Tenmile Creek, large gully on the property of Mr. A. Sexton (1967) (SE ¼ Sec. 12, T. 1 N, R. 10 W), Calhoun County, Florida.
819. Chipola Fm., Farley Creek, 0.2 mile west of bridge of Florida Highway 275 (SW ¼ Sec. 21, T. 1 N, R. 9 W), Calhoun County, Florida.
999. Chipola Fm., Farley Creek, about 300 yards downstream from bridge of Florida Highway 275 (SW ¼ Sec. 21, T. 1 N, R. 9 W), Calhoun County, Florida.
1196. Chipola Fm., Farley Creek, north bank about 0.8 mile east of bridge on Florida Highway 275 (NE ¼ Sec. 21, T. 1 N, R. 9 W), Calhoun County, Florida.
1215. Gurabo Fm., Rio Gurabo, bluffs on both sides, from the ford on Los Quemados-Sabaneta road, upstream to approximately 1 km above the ford, Dominican Republic.
1240. Moín Fm., Barrio Los Corales, top of hill at end of road that passes Standard Fruit Company box factory, 1.8 km north of main highway at Pueblo Nuevo, which is 2 km west of Puerto Limón, Costa Rica.
1399. Esmeraldas beds, Onzole Fm., roadcut on west side of village of Camarones, which is 20 km (by road) east of bridge over Rio Esmeraldas at Esmeraldas, Prov. of Esmeraldas, Ecuador.
1422. Cercado Fm., Arroyo Bellaco, which is tributary of Rio Cana from the east, coral reef that is exposed for approximately 1 km below the ford at Los Caobas Adentro, 3 km southwest of Las Caobas, Dominican Republic.

The following are Tulane University Recent collecting localities:

- R-98. *Anton Bruun* Cruise 10, dredged in 40 meters northwest of Holandes Cay, and east-northeast of Cape San Blas (9°37'N, 78°50.3'W), Panama.
- R-109. Bahia de las Minas, Isla Payardi, Prov. of Colón, Panama (7000 YBP).
- R-369. Moín Bay, north side of Limón Peninsula; material dredged from bay for fill to make oil terminal (1976), Moín, Costa Rica.
- R-487. Trawled by shrimpers off Guaymas, Sonora, Mexico.

The following is a Florida Museum of Natural History fossil locality number:

- UF CR007. Tamiami Fm., material exposed during construction of "Alligator Alley," 13.3 miles east of Florida Highway 29 (T. 49 S, R. 32 E), Collier County, Florida (TU 797 is same locality).

The following is a Naturhistorisches Museum, Basel, Switzerland, fossil locality number:

- NMB 17530. Mataruca Member, Caujaro Fm., Cementerio de Carrizal, Falcón, Venezuela.